

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

McKenzie Creek (BOD)

Waterbody Segment at a Glance:

County: Wayne
Nearby Cities: Piedmont
Length of impairment: 2.5 miles
Pollutant: Biochemical Oxygen Demand (BOD)
Source: Piedmont Wastewater Treatment Facility (WWTF)



State map showing location of watershed

See also McKenzie Creek pH Information Sheet

TMDL Priority Ranking: PIL approved by EPA 2010

Description of the Problem

Designated beneficial uses of McKenzie Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health (Fish Consumption)

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

- In the Missouri Water Quality Standards, found in 10 CSR 20-7.031 Table A, the criterion for dissolved oxygen, or DO, in streams is a minimum of 5 mg/L (milligrams per liter or parts per million).

Background information and water quality data

McKenzie Creek is a tributary to the Black River. The department conducted three water quality surveys in 2000 and 2001, which showed that the Piedmont wastewater treatment facility (lagoon), or WWTF, causes significant reductions in the dissolved oxygen levels in the lower portion of McKenzie Creek. Discharges from wastewater treatment plants are known to be high in Biochemical Oxygen Demand (BOD) and nitrogen and phosphorus. BOD and plant nutrients such as nitrogen and phosphorus can reduce the amount of dissolved oxygen in the stream's water. Reduced dissolved oxygen in the stream adversely affects aquatic organisms. A summary of water quality data for McKenzie Creek is given in the table below.

Mean Early Morning Water Quality of McKenzie Creek in the Vicinity of the Piedmont Wastewater Lagoon, 2000-2001.						
Location	Flow (cfs)	D.O. (mg/L)	Ammonia (mg/L)	Nitrate as N (mg/L)	Total Phosphorus (mg/L)	CBOD (mg/L)
McKenzie Cr. 30 yards above Piedmont Lagoon	2.6	4.1	<0.05	0.25	0.02	<2
Piedmont Wastewater Lagoon effluent	0.35	0.7	10.18	0.09	3.02	16.2
McKenzie Cr. 0.4 mile below Lagoon	4.2	1.5	0.43	0.48	0.26	<2
McKenzie Cr. 1.4 mile below Lagoon	5.1	2.3	<0.05	0.28	0.19	<2
McKenzie Cr. 2.4 miles below Lagoon	4.4	3.4	<0.05	0.17	0.08	<2

Source: Missouri Department of Natural Resources

A permit with reduced limits for BOD was issued July 3, 2008. The dissolved oxygen water quality standard of 5 mg/L will be achieved by limiting the BOD in the effluent to 20 mg/L daily maximum and 10 mg/L monthly average. The previous permit had limits for BOD of 65/45 (weekly/monthly average) mg/L.

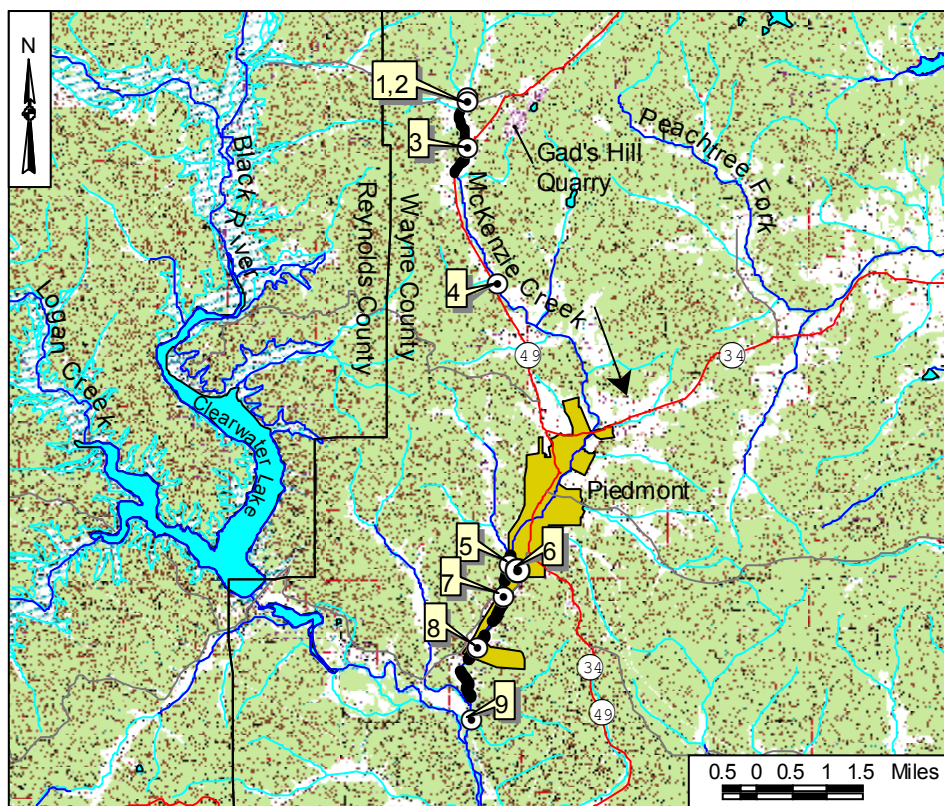
The City of Piedmont is under enforcement action because the Piedmont WWTF cannot meet limits for BOD and TSS. Abatement Order on Consent (AOC) No.997 between the City of Piedmont and the department was signed Jan. 21, 2009 (copy enclosed). The agreement in the AOC has two phases. Phase I requires interim upgrades and/or operational changes that will enable the city to comply with its current permit limits. Phase II requires later upgrades or replacement of the WWTF that will enable its effluent to meet the new limits noted above. A compliance schedule is included in the AOC with targets tied to the date of signatures. There will also be detailed schedules in the two phases of upgrades.

An added issue is a significant industrial user to the Piedmont WWTF, Windsor Foods, which discharges a high BOD load to the WWTF (historically from 936 to 8110 mg/L). In the newly issued permit, this discharge is treated as a separate outfall (#002) and the industry must meet city-mandated limits, which are set by ordinance at 300 lbs/day or 360 mg/L at 0.1 MGD. The upgrades the city is planning for the WWTF are tied to this low BOD influent stream.

The U.S. Environmental Protection Agency accepted the issued permit in lieu of a TMDL on Feb. 25, 2010.

A map of McKenzie Creek with the sampling sites is on the next page.

McKenzie Creek in Wayne County, Missouri, Showing the Impaired Segment and the Sampling Sites



Impaired Segment
 Direction of Flow

Site Index

- 5 – McKenzie Creek 30 yards above Piedmont Lagoon
- 6 – Piedmont Lagoon outfall
- 7 – McKenzie Creek 0.4 mile below Piedmont Lagoon
- 8 – McKenzie Creek 1.4 miles below Piedmont Lagoon
- 9 – McKenzie Creek 2.4 miles below Piedmont Lagoon

For more information call or write:

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